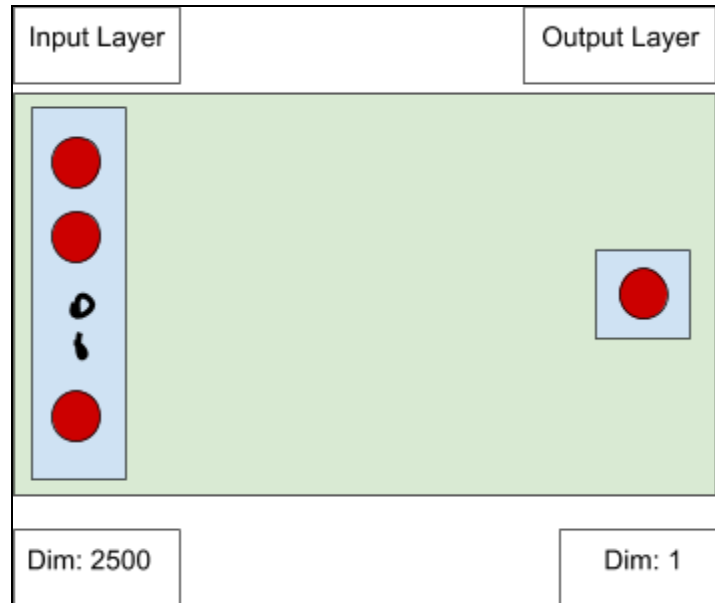


Assignment 3 - Neural Network

Experiment 1

a. Network Configuration:



b. Training Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	14	10624
Label=1	25	10587

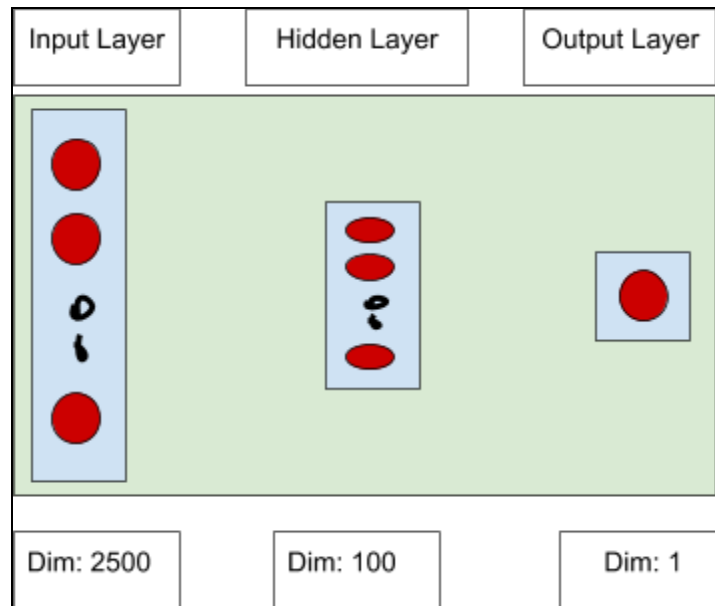
c. Validation Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	1857	5
Label=1	1863	25

- d. Epochs : 200
e. Training Accuracy : 50.1867%
f. Validation Accuracy : 50.4659%

Experiment 2

a. Network Configuration:



b. Training Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	6733	3905
Label=1	4554	6058

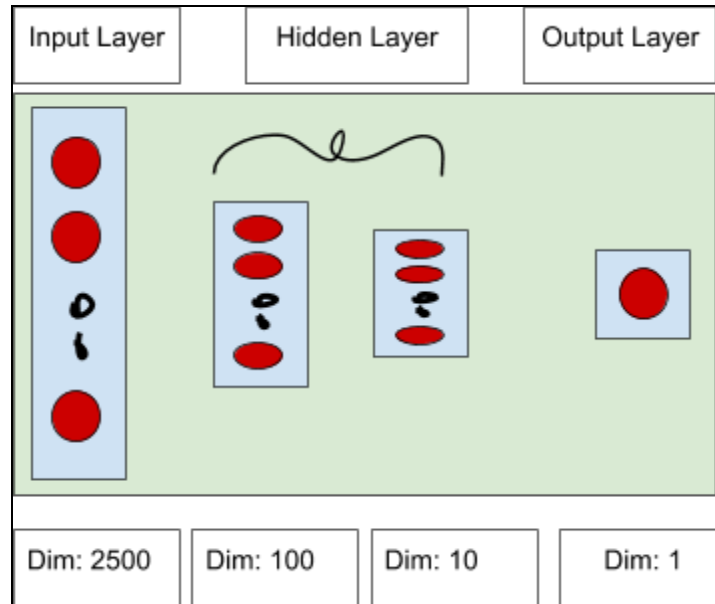
c. Validation Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	1193	669
Label=1	784	1104

- d. Epochs : 200
e. Training Accuracy : 61.2533%
f. Validation Accuracy : 60.2071%

Experiment 3

a. Network Configuration:



b. Training Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	6923	3715
Label=1	4948	5664

c. Validation Confusion Matrix:

	Prediction=0	Prediction=1
Label=0	1222	640
Label=1	850	1038

- d. Epochs : 200
e. Training Accuracy : 60.2667%
f. Validation Accuracy : 59.2518%

Observation and Comments:

1. Logistic model was not very useful and is achieving the 50% accuracy equivalent to the Random Guess as we can clearly see from confusion matrix.
2. As we start to increase the number of layer in Experiment 2, the model started to learn from the given dataset. After 200 epochs we achieved the accuracy of about 60% which is not achieved from the random guess as could be seen in the confusion matrix. The model is still confused and makes a lot of false positive and false negative predictions.
3. In Experiment 3, we added one extra layer to the Network and we could clearly see the small improvement from the last experiment as the accuracy is slightly ahead. After leaving it for 1200 epochs in a different experiment we observed an accuracy of 68% in the model.

Ways to improve accuracy (not done right now):

1. Using learning rate decay during training as we could see that the training was stagnating after reaching 68% accuracy.
2. Using higher resolution in the image (apart from 50x50).
3. More number of layers with more hidden units.

**Screenshot of the Experiment 3 after 3000 epochs:
(next page)**

Epoch:3221	mini-batch:0	loss:0.593586	accuracy:0.686541
Epoch:3222	mini-batch:0	loss:0.592631	accuracy:0.687388
Epoch:3223	mini-batch:0	loss:0.591965	accuracy:0.687624
Epoch:3224	mini-batch:0	loss:0.591526	accuracy:0.688000
Epoch:3225	mini-batch:0	loss:0.591231	accuracy:0.688518
Epoch:3226	mini-batch:0	loss:0.591041	accuracy:0.688800
Epoch:3227	mini-batch:0	loss:0.590977	accuracy:0.688471
Epoch:3228	mini-batch:0	loss:0.591227	accuracy:0.688000
Epoch:3229	mini-batch:0	loss:0.592544	accuracy:0.685976
Epoch:3230	mini-batch:0	loss:0.597753	accuracy:0.674118
Epoch:3231	mini-batch:0	loss:0.617295	accuracy:0.655435
Epoch:3232	mini-batch:0	loss:0.659766	accuracy:0.611294
Epoch:3233	mini-batch:0	loss:0.690498	accuracy:0.578918
Epoch:3234	mini-batch:0	loss:0.642380	accuracy:0.618165
Epoch:3235	mini-batch:0	loss:0.606794	accuracy:0.673600
Epoch:3236	mini-batch:0	loss:0.603659	accuracy:0.675859
Epoch:3237	mini-batch:0	loss:0.600569	accuracy:0.677882
Epoch:3238	mini-batch:0	loss:0.597729	accuracy:0.679765
Epoch:3239	mini-batch:0	loss:0.595470	accuracy:0.683388
Epoch:3240	mini-batch:0	loss:0.593839	accuracy:0.686212
Epoch:3240	mini-batch:0	loss:0.624717	accuracy:0.646133

Validation Completed

Epoch:3241	mini-batch:0	loss:0.592611	accuracy:0.686588
Epoch:3242	mini-batch:0	loss:0.591781	accuracy:0.687859
Epoch:3243	mini-batch:0	loss:0.591252	accuracy:0.688706
Epoch:3244	mini-batch:0	loss:0.590888	accuracy:0.689035
Epoch:3245	mini-batch:0	loss:0.590638	accuracy:0.689176
Epoch:3246	mini-batch:0	loss:0.590498	accuracy:0.689365
Epoch:3247	mini-batch:0	loss:0.590513	accuracy:0.689412
Epoch:3248	mini-batch:0	loss:0.591003	accuracy:0.688894
Epoch:3249	mini-batch:0	loss:0.593325	accuracy:0.679012
Epoch:3250	mini-batch:0	loss:0.602920	accuracy:0.672471
Epoch:3251	mini-batch:0	loss:0.632076	accuracy:0.633741
Epoch:3252	mini-batch:0	loss:0.691807	accuracy:0.577600
Epoch:3253	mini-batch:0	loss:0.669858	accuracy:0.595624
Epoch:3254	mini-batch:0	loss:0.609288	accuracy:0.670824
Epoch:3255	mini-batch:0	loss:0.603834	accuracy:0.674306
Epoch:3256	mini-batch:0	loss:0.600481	accuracy:0.678165
Epoch:3257	mini-batch:0	loss:0.597514	accuracy:0.680424
Epoch:3258	mini-batch:0	loss:0.595172	accuracy:0.684565
Epoch:3259	mini-batch:0	loss:0.593489	accuracy:0.686824
Epoch:3260	mini-batch:0	loss:0.592281	accuracy:0.687624
Epoch:3260	mini-batch:0	loss:0.624713	accuracy:0.644000

Validation Completed

